

SOUTHWEST FISHERIES SCIENCE CENTER
FOURTH QUARTER REPORT-FY 2002
For the Period July 1, 2002 - September, 30, 2002

Submitted by: John Hunter, Division Director, Fisheries Division.

Title of Accomplishment or Milestone: North Pacific albacore assessment and research: (1) critically review/finalize baseline 'data' files (time series of length distributions and catch/effort estimates) for inclusion in a deterministic stock assessment model (tuned-VPA) and a statistical assessment model (MULTIFAN-CL) in efforts to examine the status of the population, including determination of historical and current levels of stock abundance, fishing mortality, biological reference points, etc.; and subsequently, (2) compare/contrast the results generated from the different methods (general and detailed modeling) used to assess the population. Research involves collaboration with Japanese scientists.

Current Status of Accomplishment or Milestone: (1) Northeastern Pacific Ocean fishery (including, USA, Canada, and Mexico fisheries) data have been summarized and included in both data files above—information was presented at the *Intersessional North Pacific Albacore Workshop* (NPALBW) held in Nagasaki, Japan earlier this year—however, additional review of Northwestern Pacific Ocean fishery (Japan, Taiwan, and Korea) data is still being completed; (2) a baseline model has been run for both assessment approaches, with sensitivity analysis slated for this fall 2002—initial results will be presented at the upcoming *Eighteenth North Pacific Albacore Workshop*, which will be held in La Jolla (SWFSC) in early December 2002.

Background: In the beginning of this year, members of the NPALBW, particularly, scientists from Japan and the USA (SWFSC) committed to undertaking development of critical data files that could be incorporated into assessment models to address the dynamics of the north Pacific Ocean-wide albacore population. The work has involved reviewing, estimating, and summarizing fishery-related time series from all countries that have exploited the stock over the years. Tasks involved in this work have included rigorous examination of available sample data, consensus regarding important assumptions and construction of important time series used in the models, general and detailed treatment of the data during the modeling stages and finally, summarizations of the substantial amount of results generated from the modeling efforts (e.g., sensitivity runs and profiles of important fishery parameters). Both parties (USA and Japan) agreed that considerable time and effort should be focused on the data files prior to any modeling efforts, given the extent and potential biases associated with the historical data sets. Initial results from baseline model configurations are expected to be presented at the *Eighteenth NPALBW*.

Purpose of Activity: Ultimately, the objectives of this research are to improve the current understanding of the dynamics of the albacore population and ultimately, to provide accurate estimates of important fishery parameters needed to manage the stock in sustainable terms, including historical and current estimates of adult biomass, spawning stock biomass, recruitment, and fishing mortality rates. However, 'the means to the end' are also expected to provide useful information concerning 'robust vs. sensitive' areas of stock assessment methods in general, i.e., by contrasting results generated through two, quite different interpretations of available sample data; a general analysis (more reliant on researcher assumptions) and detailed analysis (more reliant on statistical theory).

Description of Accomplishment and significant results: The baseline data files that essentially serve as the foundation for the two assessment approaches are nearly complete. Portions of the data files still need further attention (see *Current Status of Accomplishment*); however, general modeling efforts have begun in an effort to establish a stable modeling platform to carry out sensitivity analysis in the future. Specifically, construction of the tuned-VPA model required rather straightforward methods that involved a substantial amount of work 'outside' of the actual modeling effort, i.e., researcher-specific decisions regarding sample substitution for major fisheries with little to no information—this was done in concert with primarily Japanese

scientists. As expected, the construction of the MULTIFAN-CL model has been slow, but successful, given the underlying complexity of the actual modeling software, coupled with time demands involved in determination of the time series included in the data file. We've strived to construct both models using a generally similar spatial/temporal design to ensure generated results can be, at the very least, compared/contrasted qualitatively. The overall research generally required partitioning fishery-specific (roughly, 15-20 'independent' fisheries, depending on the model) sample data into spatial and temporal blocks from 1975-01. For the VPA model, a single catch-at-age matrix for the combined fisheries is nearly complete and has involved working closely with Japan's scientists to 'mesh' sample data using the most plausible assumptions and substitution practices. For the MULTIFAN-CL model, the integrity of the individual fisheries is maintained within the model, i.e., conversions from length distributions to age distributions and issues surrounding selectivity/catchability between the different fisheries are explored objectively based on a fully-integrated statistical approach. Again, a concerted effort between Japan and USA scientists was needed to construct the data file for the MULTIFAN-CL modeling exercise.

Significance of Accomplishment: The significance of the research is threefold, given the importance of such work to increasing the current understanding of albacore population dynamics, the current understanding of assessment methods used in fishery science and lastly, developing a cooperative, international-based working environment for future assessments that concern a highly mobile fish population that inhabits vast areas of the Pacific Ocean at various times throughout a given year. The last point is not a trivial objective, given the stock's importance to various countries that largely rely on the NPALBW for all population-wide information concerning the status of the stock at large, i.e., it is imperative that all countries that have vested interest in the population be involved in summarizing sample data applicable to their respective country's fisheries, which will ensure the most accurate sample information is used to assess the stock and ultimately, provide appropriate management advice.

Problems: Construction of important time series has been problematic, given sample data are sparse for certain fisheries and have been collected opportunistically (vs. systematically) at times in some of the fisheries. As expected, developing a baseline model within the MULTIFAN-CL programming environment has been tedious, given the complex structure of the modeling platform. Working through some of the quantitative exercises with international colleagues without the luxury of on-site interactions has hindered progress at times, but we continue to support an inclusive working group, given the importance of the research objectives.

Key Contact: Paul R. Crone (858-546-7069; pcrone@ucsd.edu).